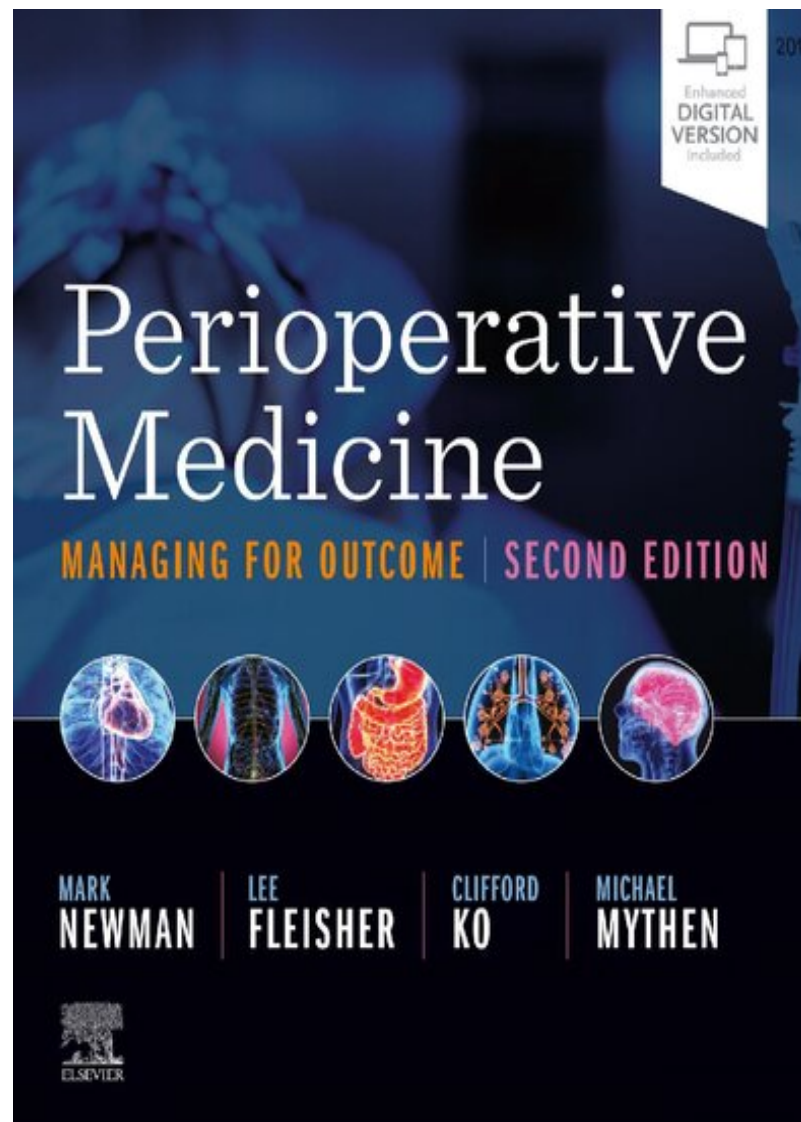


Perioperative Medicine: Managing for Outcome, 2nd Edition Mark Newman pdf download

<https://ebookmass.com/product/perioperative-medicine-managing-for-outcome-2nd-edition-mark-newman/>

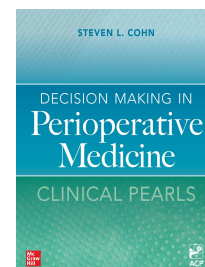


Explore and download more ebooks at ebookmass.com

We believe these products will be a great fit for you. Click the link to download now, or visit ebookmass.com to discover even more!

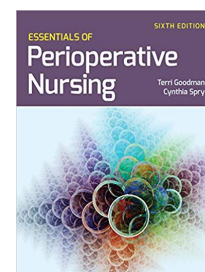
**Decision Making in Perioperative Medicine: Clinical Pearls
Steven L. Cohn**

<https://ebookmass.com/product/decision-making-in-perioperative-medicine-clinical-pearls-steven-l-cohn/>



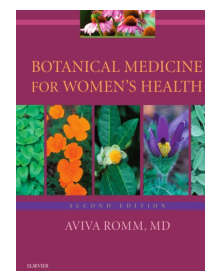
**(eTextbook PDF) for Essentials of Perioperative Nursing
6th Edition**

<https://ebookmass.com/product/etextbook-pdf-for-essentials-of-perioperative-nursing-6th-edition/>



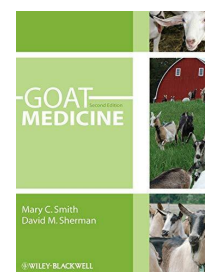
**Botanical medicine for women's health 2nd edition Edition
Hardy**

<https://ebookmass.com/product/botanical-medicine-for-womens-health-2nd-edition-edition-hardy/>



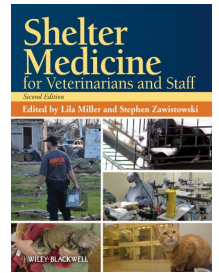
Goat Medicine, 2nd Edition

<https://ebookmass.com/product/goat-medicine-2nd-edition/>



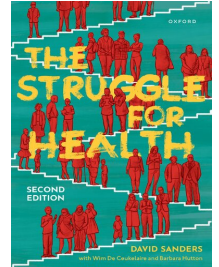
Shelter Medicine for Veterinarians and Staff 2nd Edition, (Ebook PDF)

<https://ebookmass.com/product/shelter-medicine-for-veterinarians-and-staff-2nd-edition-ebook-pdf/>



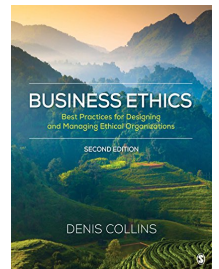
The Struggle for Health: Medicine and the politics of underdevelopment 2nd Edition David Sanders

<https://ebookmass.com/product/the-struggle-for-health-medicine-and-the-politics-of-underdevelopment-2nd-edition-david-sanders/>



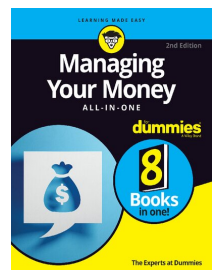
Business Ethics: Best Practices for Designing and Managing Ethical Organizations 2nd Edition, (Ebook PDF)

<https://ebookmass.com/product/business-ethics-best-practices-for-designing-and-managing-ethical-organizations-2nd-edition-ebook-pdf/>



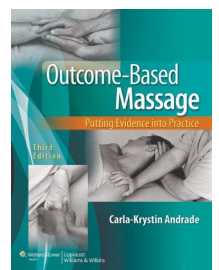
Managing Your Money All-in-One For Dummies, 2nd Edition The Experts At Dummies

<https://ebookmass.com/product/managing-your-money-all-in-one-for-dummies-2nd-edition-the-experts-at-dummies/>



Outcome-Based Massage: Putting Evidence into Practice Third Edition

<https://ebookmass.com/product/outcome-based-massage-putting-evidence-into-practice-third-edition/>





Enhanced
**DIGITAL
VERSION**
Included

2014

Perioperative Medicine

MANAGING FOR OUTCOME | **SECOND EDITION**



**MARK
NEWMAN**

**LEE
FLEISHER**

**CLIFFORD
KO**

**MICHAEL
MYTHEN**



Any screen. Any time. Anywhere.

Activate the eBook version
of this title at no additional charge.



Elsevier eBooks for Practicing Clinicians gives you the power to browse and search content, view enhanced images, highlight and take notes—both online and offline.

Unlock your eBook today.

1. Visit expertconsult.inkling.com/redeem
2. Scratch box below to reveal your code
3. Type code into “Enter Code” box
4. Click “Redeem”
5. Log in or Sign up
6. Go to “My Library”

It's that easy!

For technical assistance:
email expertconsult.help@elsevier.com
call 1-800-401-9962 (inside the US)
call +1-314-447-8300 (outside the US)

Place Peel Off
Sticker Here

Perioperative Medicine

This page intentionally left blank

Perioperative Medicine

Managing for Outcome

SECOND EDITION

Mark F. Newman, MD

Executive Vice President for Health Affairs
University of Kentucky (UK) Health-care
Professor of Anesthesiology
University of Kentucky College of Medicine
Lexington, Kentucky

Lee A. Fleisher, MD

Robert D. Dripps Professor and Chair
Department of Anesthesiology and Critical Care
Professor of Medicine
University of Pennsylvania School of Medicine
Philadelphia, Pennsylvania

Clifford Ko, MD, MS, MSHS, FACS, FASCRS, FASMBS (Hon)

Director of UCLA Center for Surgical Outcomes and Quality
Department of Surgery Professor of Surgery
University of California, Los Angeles
Los Angeles, California

Michael (Monty) Mythen, MBBS, MD, FRCA, FFICM, FCAI (Hon)

Smiths Medical Professor of Anaesthesia and Critical Care
University College London
London, United Kingdom



ELSEVIER

1600 John F. Kennedy Blvd.
Ste 1600
Philadelphia, PA 19103-2899

PERIOPERATIVE MEDICINE, Second Edition
Copyright © 2022 by Elsevier, Inc. All rights reserved.

ISBN: 978-0-323-56724-4

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the publisher. Details on how to seek permission, further information about the Publisher's permissions policies and our arrangements with organizations such as the Copyright Clearance Center and the Copyright Licensing Agency, can be found at our website: www.elsevier.com/permissions.

This book and the individual contributions contained in it are protected under copyright by the Publisher (other than as may be noted herein).

Notice

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds or experiments described herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made. To the fullest extent of the law, no responsibility is assumed by Elsevier, authors, editors or contributors for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.

Previous editions copyrighted 2008.

Library of Congress Control Number: 2020936804

Content Strategist: Sarah Barth
Content Development Manager: Claire McKenzie
Content Development Specialist: Dominique McPherson
Publishing Services Manager: Deepthi Unni
Book Project Manager: Haritha Dharmarajan

Printed in the United States of America

Last digit is the print number: 9 8 7 6 5 4 3 2 1



*To our past, current, and future residents, fellows,
and faculty, who, through their dedication,
continue to advance the field of perioperative
medicine and
the care of our patients.*

To our families, who have been so supportive:

*To my wife, Susan, a partner, a friend, and, most
important, a believer without whom I would be
incomplete.*

*To my mother and late father, who let me know that
no matter what I accomplished it would be okay.
And to my kids, Sarah, Jack, and Catherine, who
remind me every day of the importance of what
we do and what we learn.*

Mark F. Newman

*To my wife, Renee, who has been a partner and best
friend for the past 30 years. To my children,
Jessica and Matthew, for their unconditional love
and support and constant reminder about the
important things in life. Finally, to my parents and
grandparents, who instilled in me the desire to
always seek new knowledge.*

Lee A. Fleisher

In loving memory of Siobhan Mythen R.I.P.

Monty Mythen

*"To my family, friends, and colleagues, thank you for all
you do to make things better"*

Clifford Ko

Contributors

Vatche G. Agopian, MD

Associate Professor
Director - Dumont-UCLA Liver Cancer Center
Associate Director - General Surgery Residency
Program, Liver Transplantation and Hepatobiliary
Surgery Department of Surgery
David Geffen School of Medicine at University of California
Los Angeles, California
35 – Solid Organ Transplantation

Ehab Al-Bizri, MD

Resident Physician
Department of Anesthesiology
Stony Brook Medicine
Stony Brook, New York
**25 – Prevention and Treatment of Gastrointestinal
Morbidity**

Benjamin Y. Andrew, MD, MHS

Resident Physician
Department of Anesthesiology
Duke University
Durham, North Carolina
17 – Preservation of Renal Function

Thomas L. Archer, MD, MBA

Clinical Professor (retired)
Department of Anesthesiology
University of California San Diego
La Jolla, California
44 – Economic Analysis of Perioperative Optimization

Gareth L. Ackland, PhD, FRCA, FFICM, FHEA

Translational Medicine & Therapeutics
William Harvey Research Institute
Barts and The London School of Medicine and Dentistry
Queen Mary, University of London
John Vane Science Centre, Charterhouse Square
London, United Kingdom
2 – The Inflammatory Response to Surgery

John G. Augoustides, MD, FASE, FAHA

Professor and Fellowship Director
Cardiovascular and Thoracic Section
Department of Anesthesiology and Critical Care
Perelman School of Medicine
University of Pennsylvania
Philadelphia, Pennsylvania
**22 – Protecting the Central Nervous System during
Cardiac Surgery**

Diana Ayubcha, DO, MS

Assistant Professor
Associate Program Director Neuroscience in Anesthesiology
and Critical Care Fellowship
Department of Anesthesiology and Critical Care
Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania
**5 – Perioperative Cardiac Risk Assessment in Noncardiac
Surgery**

Angela Bader, MD, MPH

Professor of Anesthesia
Anesthesiology, Perioperative Medicine and Pain
Harvard Medical School/Brigham Health;
Vice Chair for Perioperative Medicine
Department of Anesthesiology
Perioperative Medicine and Pain
Brigham and Women's Hospital
Boston, Massachusetts
4 – The Value of Preoperative Assessment

Shyamasundar Balasubramanya, MD, FACS, FACC, FCCP, FAAP

Health Sciences Assistant Clinical Professor
University of California Los Angeles (UCLA)
David Geffen School of Medicine
Division of Cardiac Surgery
Ronald Reagan UCLA Medical Center
Los Angeles, California
35 – Solid Organ Transplantation

Peyman Benharash, MD, MS

Associate Professor of Surgery and Bioengineering
Division of Cardiac Surgery
David Geffen School of Medicine at UCLA
Los Angeles, California
6 – Cardiovascular Risk Assessment in Cardiac Surgery

Miles Berger, MD, PhD

Assistant Professor of Anesthesiology
Duke University Medical Center
Durham, North Carolina
42 – Postoperative Cognitive Dysfunction and Delirium

Muath Bishawi, MD

Division of Cardiothoracic Surgery
Department of Surgery
Duke University
Durham, North Carolina
**13 – Treatment of Perioperative Ischemia
Infarction, and Ventricular Failure in Cardiac Surgery**

Victoria Bradford, MD, MBA

Assistant Professor
Anesthesiology
University of Kentucky
Lexington, Kentucky

30 – Preservation of Fetal Viability during Noncardiac Surgery

Thomas Buchheit, MD, CIPS

Director of Regenerative Pain Therapies
Center for Translational Pain Medicine
Department of Anesthesiology
Duke University
Durham, North Carolina

41 – Improving Pain and Outcomes in the Perioperative Setting

Christopher R. Burke, MD

Assistant Professor of Cardiac Surgery
Division of Cardiothoracic Surgery
Associate Program Director
Cardiothoracic Surgery Residency Programs
University of Washington,
Seattle, Washington

11 – Prevention of Ischemic Injury in Cardiac Surgery

Maurizio Cereda, MD

Associate Professor
Co-Director Surgical ICU
Department of Anesthesiology and Critical Care
University of Pennsylvania
Philadelphia, Pennsylvania

9 – Pulmonary Risk Assessment

Anne Cherry, MD

Assistant Professor
Department of Anesthesiology
Duke University School of Medicine
Durham, North Carolina

17 – Preservation of Renal Function

Albert T. Cheung, MD

Professor
Department of Anesthesiology
Stanford University School of Medicine,
Stanford, California;
Professor Emeritus
Department of Anesthesiology
University of Pennsylvania School of Medicine
Philadelphia, Pennsylvania

23 – Preservation of Spinal Cord Function

Kathleen Claus, MD

Assistant Professor, Critical Care Medicine
Department of Anesthesiology
Duke University
Durham, North Carolina

26 – Prevention and Management of Deep Vein Thrombosis and Pulmonary Embolism

Benedict Charles Creagh-Brown, BM, FRCP, PhD, DICM, FFICM

Consultant
Intensive Care Unit
Royal Surrey County Hospital;
Reader (Clinical)
Clinical Medicine
University of Surrey
Guildford, United Kingdom

20 – Prevention and Treatment of Postoperative Pulmonary Complications

Jovany Cruz Navarro, MD

Assistant Professor
Department of Anesthesiology
Department of Neurosurgery
Baylor College of Medicine
Ben Taub General Hospital
Houston, Texas

24 – Perioperative Management of Acute Central Nervous System Injury

James DeBritz, MD

Assistant Professor and Director of Orthopedic Trauma
Department of Orthopedic Surgery
The George Washington University School of Medicine and
Health Sciences
Washington, D.C.

34 – Major Orthopedic Surgery

Timothy J. Donahue, DO

Surgery
University of Texas
Houston, Texas

36 – Multisystem Trauma

Stephen A. Esper, MD, MBA

Assistant Professor
Director of Center for Perioperative Care
Department of Anesthesiology and Perioperative Medicine
University of Pittsburgh School of Medicine
Pittsburgh, Pennsylvania

15 – Prevention and Management of Perioperative Dysrhythmias

Amanda L. Faulkner, MD, D.ABA

Assistant Professor
Department of Anesthesiology
Duke University
Durham, North Carolina

37 – Neurosurgery

Duane J. Funk, MD, FRCPC

Associate Professor
Anesthesiology and Medicine
University of Manitoba
Manitoba, Canada

40 – Endocrine and Electrolyte Disorders

Robert Gaiser, MD

Chair and Professor
Anesthesiology
University of Kentucky
Lexington, Kentucky
30 – Preservation of Fetal Viability during Noncardiac Surgery

Tong J. Gan, MD, MBA, MHS, FRCA

Professor and Chairman
Department of Anesthesiology
Stony Brook University Renaissance School of Medicine
Stony Brook, New York
25 – Prevention and Treatment of Gastrointestinal Morbidity

Stephen Harrison Gregory, MD

Assistant Professor of Anesthesiology
Medical Director, Center for Preoperative Assessment and Planning
Washington University in St. Louis School of Medicine
St. Louis, Missouri
12 – Prevention of Ischemic Injury in Noncardiac Surgery

Michael P.W. Grocott

Anaesthesia and Critical Care Research Area
NIHR Southampton Biomedical Research Centre
University Hospital Southampton NHS Foundation Trust;
Integrative Physiology and Critical Illness Group
Clinical and Experimental Sciences, Faculty of Medicine
University of Southampton
Southampton, United Kingdom
46 – Delivering Value Based Care: The UK Perspective

Taras Grosh, MD

Assistant Professor
Regional and Orthopedic Anesthesiology
Department of Anesthesiology & Critical Care
Hospital of the University of Pennsylvania & Pennsylvania Presbyterian Medical Center
Philadelphia, Pennsylvania
5 – Perioperative Cardiac Risk Assessment in Noncardiac Surgery

Holden K. Groves, MD, MSc, MAS

Assistant Professor of Anesthesiology
Columbia University
New York
19 – Perioperative Management of Renal Failure and Renal Transplant

Dhanesh K. Gupta, MD, MBA

Professor of Anesthesiology
Anesthesiology;
Chief of Neurosurgical & Spine Anesthesiology
Anesthesiology;
Chief of Non-Operating Room Anesthesiology
Anesthesiology
Duke University, Durham, North Carolina
21 – Carotid and Intracranial Surgery

Rachel A. Hadler, MD

Assistant Professor
Anesthesiology and Critical Care
University of Pennsylvania Perelman School of Medicine
Philadelphia, Pennsylvania
43 – Role of Palliative Care

Steven Ellis Hill, MD

Professor
Anesthesiology and Pain Management
UT Southwestern Medical Center
Dallas, Texas
27 – Perioperative Management of Bleeding and Transfusion

Michael Holmes, MD

Division of Cardiothoracic Anesthesiology and Critical Care Medicine
Department of Anesthesiology and Pain Medicine
University of Washington
Seattle, Washington
31 – Cardiac Surgery

Q. Lina Hu, MD, MS

Clinical Scholar in Residence
Division of Research and Optimal Patient Care
American College of Surgeons
Chicago, Illinois
Resident Physician
Department of Surgery
University of California, Los Angeles
California
28 – Prevention of Perioperative Surgical Site Infection

Peter Inglis, BMBS

Anesthesia
University of Manitoba
Winnipeg, Canada
40 – Endocrine and Electrolyte Disorders

Andrew Iskander, MD

Pediatric Anesthesiologist
Anesthesiology
New York Medical College
Valhalla, New York
25 – Prevention and Treatment of Gastrointestinal Morbidity

Alexander I.R. Jackson

Anaesthesia and Critical Care Research Area
NIHR Southampton Biomedical Research Centre
University Hospital Southampton NHS Foundation Trust;
Integrative Physiology and Critical Illness Group
Clinical and Experimental Sciences, Faculty of Medicine
University of Southampton
Southampton, United Kingdom
46 – Delivering Value Based Care: the UK Perspective

Visit <https://ebookmass.com> today to explore

a vast collection of ebooks across various genres, available in popular formats like PDF, EPUB, and MOBI, fully compatible with all devices. Enjoy a seamless reading experience and effortlessly download high-quality materials in just a few simple steps. Plus, don't miss out on exciting offers that let you access a wealth of knowledge at the best prices!

Amir K. Jaffer, MD, MBA, SFHM

Chief Medical Officer
New York, Presbyterian Queens Hospital
Queens, New York

47 – Transitions from Hospital to Home

Michael L. James, MD

Associate Professor
Anesthesiology
Neurology
Duke University;
Neuroscience Medicine
Duke Clinical Research Institute
Durham, North Carolina

21 – Carotid and Intracranial Surgery

37 – Neurosurgery

Timothy F. Jones, BA, MSci, MBBS, MRCS

Clinical Research Fellow
William Harvey Research Institute
Barts and The London School of Medicine and Dentistry
London, United Kingdom

2 – The Inflammatory Response to Surgery

Tammy Ju, MD

Surgery Resident
Surgery
George Washington University Hospital
Washington, D.C.

34 – Major Orthopedic Surgery

Lillian S. Kao, MD, MS

Professor
Surgery
McGovern Medical School
University of Texas Health Science Center at Houston
Houston, Texas

36 – Multisystem Trauma

John A. Kellum, MD, MCCM

Professor and Vice Chair
Department of Critical Care Medicine
University of Pittsburgh
Pittsburgh, Pennsylvania

18 – Evaluation and Treatment of Acute Oliguria

Miklos D. Kertai, MD, PhD

Professor of Anesthesiology
Department of Anesthesiology
Vanderbilt University School of Medicine
Nashville, Tennessee

8 – Risk Assessment and Perioperative Renal Dysfunction

Clifford Y. Ko, MD, MS, MSHS

American College of Surgeons
Chicago, Illinois;
Director of UCLA Center for Surgical Outcomes and Quality
Department of Surgery Professor of Surgery
University of California, Los Angeles
Los Angeles, California

28 – Prevention of Perioperative Surgical Site Infection

45 – Improving Health-Care Quality Through Measurement

W. Andrew Kofke, MD, MBA, FCCM, FNCS

Professor, Director Neuroscience in Anesthesiology and
Critical Care Program

Co-Director Neurocritical Care

Co-Director Perioperative Medicine and Pain Clinical
Research Unit

Department of Anesthesiology and Critical Care

Department of Neurosurgery

University of Pennsylvania

Philadelphia, Pennsylvania

24 – Perioperative Management of Acute Central Nervous System Injury

H.T. Lee, MD, PhD

Director of Transplant Anesthesiology and Vice Chair for
Laboratory Research

Professor of Anesthesiology

Department of Anesthesiology

Columbia University

New York

19 – Perioperative Management of Renal Failure and Renal Transplant

Jane Lee, MD, PhD

General Surgeon, General Surgery

Stephen's Memorial Hospital

Norway, Maine;

General Surgeon, General Surgery

Maine Medical Center

Portland, Maine

35 – Solid Organ Transplantation

Jason B. Liu, MD, MS

Clinical Scholar in Residence

Division of Research and Optimal Patient Care

American College of Surgeons;

Department of Surgery

University of Chicago Medicine

Chicago, Illinois

45 – Improving Health-Care Quality Through Measurement

Jessica Y. Liu, MD, MS

Resident Physician

Department of Surgery

Emory University

Atlanta, Georgia

Clinical Scholar in Residence

Division of Research and Optimal Patient Care

American College of Surgeons

Chicago, Illinois

33 – Major Abdominal Surgery

Alex Macario, MD, MBA

Professor

Department of Anesthesiology

Perioperative and Pain Medicine

Stanford University, Stanford, California

44 – Economic Analysis of Perioperative Optimization

G. Burkhard Mackensen, MD, PhD, FASE

Director of Interventional Echocardiography
 Chief, Division of Cardiothoracic Anesthesiology
 Adjunct Professor of Medicine
 UW Medicine Heart Institute
 UW Medicine Research & Education Endowed Professor in
 Anesthesiology
 University of Washington
 Seattle, Washington
31 – Cardiac Surgery

Erin Maddy, MD

Anesthesiologist
 Essentia Health
 Duluth, Minnesota
**44 – Economic Analysis of Perioperative
 Optimization**

Aman Mahajan, MD, PhD

Professor and Chair
 Department of Anesthesiology and Perioperative
 Medicine
 University of Pittsburgh School of Medicine
 Pittsburgh, Pennsylvania
**15 – Prevention and Management of Perioperative
 Dysrhythmias**

Joseph P. Mathew, MD, MHSc, MBA

Professor and Chairman
 Anesthesiology
 Duke University Medical Center
 Durham, North Carolina
**14 – Perioperative Management of Valvular Heart
 Disease**
**42 – Postoperative Cognitive Dysfunction and
 Delirium**

Megan Maxwell, MD

Assistant Professor
 Anesthesiology
 UT Southwestern
 Dallas, Texas
**7 – Central Nervous System Risk Assessment: Preventing
 Postoperative Brain Injury**

David L. McDonagh, MD

Departments of Anesthesiology and Pain Management;
 Department of Neurology and Neurotherapeutics;
 Department of Neurosurgery;
 UT Southwestern Medical Center
 Dallas, Texas
**7 – Central Nervous System Risk Assessment: Preventing
 Postoperative Brain Injury**

Meghan Michael, MD

Assistant Professor
 Anesthesiology and Pain Management
 University of Texas Southwestern Medical Center
 Dallas, Texas
**7 – Central Nervous System Risk Assessment: Preventing
 Postoperative Brain Injury**

Carmelo A. Milano, MD

Chief, Section of Adult Cardiac Surgery;
 Surgical Director for LVAD Program;
 Professor of Surgery
 Duke University Medical Center
 Durham, North Carolina
**13 – Treatment of Perioperative Ischemia,
 Infarction, and Ventricular Failure in Cardiac Surgery**

Richard C. Month, MD

Assistant Professor of Clinical Anesthesiology
 Department of Anesthesiology and Critical Care
 University of Pennsylvania Health System;
 Chief of Obstetrical Anesthesia
 Hospital of the University of Pennsylvania
 Philadelphia, Pennsylvania
29 – Perioperative Protection of the Pregnant Woman

Eugene W. Moretti, MD, MHSc, FASA

Professor of Anesthesiology
 Department of Anesthesiology
 Duke University Medical Center
 Durham, North Carolina
40 – Endocrine and Electrolyte Disorders

Rotem Naftalovich, MD, MBA

Head of Neurosurgical Anesthesia
 Residency - Assistant Program Director
 Department of Anesthesia & Perioperative Care
 Rutgers - New Jersey Medical School
 Newark, New Jersey
**25 – Prevention and Treatment of Gastrointestinal
 Morbidity**

Mark F. Newman, MD

Executive Vice President for Health Affairs
 University of Kentucky (UK) Health-Care
 Professor of Anesthesiology
 University of Kentucky Medical College
 Lexington, Kentucky
**1 – Implications of Perioperative Morbidity for Long-Term
 Outcomes**
42 – Postoperative Cognitive Dysfunction and Delirium

Daisuke Francis Nonaka, MD

Assistant Professor
 Anesthesiology and Pain Management
 University of Texas Southwestern Medical Center
 Dallas, Texas
**27 – Perioperative Management of Bleeding and
 Transfusion**

Prakash A. Patel, MD, FASE

Assistant Professor
 Anesthesiology and Critical Care
 University of Pennsylvania
 Philadelphia, Pennsylvania
10 – Hematologic Risk Assessment

Jamie R. Privratsky, MD, PhD

Assistant Professor
Anesthesiology
Duke University
Durham, NC

17 – Preservation of Renal Function

Vijay K. Ramaiah, MBBS, MD

Assistant Professor
Anesthesiology
Duke University
Durham, North Carolina

21 – Carotid and Intracranial Surgery

Neil Ray, MD

Assistant Professor
Department of Anesthesiology
Duke University
Durham, North Carolina

41 – Improving Pain and Outcomes in the Perioperative Setting

Annette Rebel, MD

Professor
Anesthesiology
Surgery
University of Kentucky
Lexington, Kentucky

3 – The Coagulation Cascade in Perioperative Organ Injury

Lisbi Rivas, MD

Resident Physician
Surgery
George Washington University
Washington, DC

34 – Major Orthopedic Surgery

Kristen C. Rock, MD

Assistant Professor
Anesthesia and Critical Care Medicine
University of Pennsylvania
Philadelphia, Pennsylvania

1 – Implications of Perioperative Morbidity for Long-Term Outcomes

Jill S. Sage, MPH

American College of Surgeons
Chicago, Illinois

45 – Improving Health-Care Quality Through Measurement

Yas Sanaiha, MD

General Surgery Resident
General Surgery
David Geffen School of Medicine at UCLA
Los Angeles, California

6 – Cardiovascular Risk Assessment in Cardiac Surgery

Babak Sarani, MD

Professor
Emergency Medicine
Surgery
George Washington University
Washington, D.C.

34 – Major Orthopedic Surgery

Ryan D. Scully, MD, LCDR, MC, USN

Department of Orthopaedic Surgery
Naval Hospital Camp Pendleton
California

34 – Major Orthopedic Surgery

Jyotirmay Sharma, MD, FACS, FACE

Associate Professor and William C McGarity Chair in
Surgery
Vice-Chair for Quality
Patient Safety and Innovation
Department of Surgery
Emory University School of Medicine
Atlanta, Georgia

33 – Major Abdominal Surgery

Robert A. Sickeler, MD

Attending Anesthesiologist
Anesthesiology
Stamford Hospital
Stamford, Connecticut

8 – Risk Assessment and Perioperative Renal Dysfunction

Martin I. Sigurdsson, MD, PhD

Chief of Anesthesiology and Critical Care
Department of Anesthesiology and Critical Care
Landspítali University Hospital
Professor of Anesthesiology and Critical Care
University of Iceland
Reykjavik, Iceland

14 – Perioperative Management of Valvular Heart Disease

Mervyn Singer, MBBS, MD, FRCP(Lon), FRCP(Edin), FFICM

Professor of Intensive Care Medicine
University College London
Director
Bloomsbury Institute of Intensive Care Medicine
Chair, International Sepsis Forum;
NIHR Emeritus Senior Investigator
London, United Kingdom

38 – Sepsis and Septic Shock

Pingping Song, MD

Division of Cardiothoracic Anesthesiology and Critical Care
Medicine
Department of Anesthesiology and Pain Medicine
University of Washington
Seattle, Washington

31 – Cardiac Surgery

Audrey E. Spelde, BA, MD

Critical Care Fellow
Anesthesiology and Critical Care
The University of Pennsylvania
Philadelphia, Pennsylvania
10 – Hematologic Risk Assessment

Mark Stafford-Smith, MD, CM, FRCPC, MBA, FASE

Professor
Department of Anesthesiology
Duke University Medical Center
Durham, North Carolina
17 – Preservation of Renal Function

Kirsten R. Steffner, MD

Clinical Assistant Professor
Department of Anesthesiology
Perioperative & Pain Medicine
Stanford University
Stanford, California
23 – Preservation of Spinal Cord Function

Toby B. Steinberg, MD

Adult Cardiothoracic Anesthesiology Fellow
Department of Anesthesia and Critical Care
Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania
43 – Role of Palliative Care

Dr. Charlotte Summers, BSc(Hons), BM, PhD, FRCP, FFICM

University Lecturer in Intensive Care Medicine
Department of Medicine
University of Cambridge
Cambridge, United Kingdom
39 – Acute Respiratory Failure

Ramesh Swamiappan, MBBS

Anesthesiology Critical Care Medicine Fellow
Department of Anesthesiology and Critical Care
University of Pennsylvania
Philadelphia, Pennsylvania
9 – Pulmonary Risk Assessment

Annemarie Thompson, MD

Professor
Anesthesiology and Medicine
Duke University
Durham, North Carolina
12 – Prevention of Ischemic Injury in Noncardiac Surgery

Rachel E. Thompson, MD, MPH, SFHM

Chief, Hospital Medicine
Medical Director
Clinical Care Transitions
University of Nebraska Medical Center
Lincoln, Nebraska
47 – Transitions from Hospital to Home

Thomas K. Varghese, Jr, MD, MS, FACS

Executive Medical Director & Chief Value Officer –
Huntsman Cancer Institute
Section Chief – General Thoracic Surgery
Program Director – Integrated Thoracic Surgery
Residency & CT Surgery Fellowship Programs
Professor (Tenure Track) of Surgery
University of Utah, Salt Lake City
32 – General Thoracic Surgery

Edward D. Verrier, MD

Merendino Professor of Cardiovascular Surgery
Surgery
University of Washington
Seattle, Washington
11 – Prevention of Ischemic Injury in Cardiac Surgery

Nathan H. Waldron, MD, MHSc

Assistant Professor
Department of Anesthesiology
Duke University School of Medicine
Durham, North Carolina
14 – Perioperative Management of Valvular Heart Disease

Sophie Louisa May Walker, MBBS, BSc

Clinical Research Fellow
William Harvey Research Centre
Queen Mary University of London
London, United Kingdom
2 – The Inflammatory Response to Surgery

Ian J. Welsby, BSc, MBBS

Professor
Anesthesiology and Critical Care
Duke University
Chapel Hill
North Carolina
26 – Prevention and Management of Deep Vein Thrombosis and Pulmonary Embolism

Acknowledgment

We wish to express our gratitude to the numerous people who helped in the development and production of our book. First, the editorial assistants in our offices, Michael Hatfield, Kate Musselman, and Cheri Hepfl, were invaluable in

multiple steps in the process. We are also indebted to our publisher and the Elsevier staff who helped in the production of this book.

Contents

PART I INTRODUCTION AND BACKGROUND

- 1 *Implications of Perioperative Morbidity for Long-Term Outcomes, 2*
KRISTEN C. ROCK, MARK F. NEWMAN, and LEE A. FLEISHER
- 2 *The Inflammatory Response to Surgery, 9*
GARETH L. ACKLAND, SOPHIE LOUISA MAY WALKER, and TIMOTHY F. JONES
- 3 *The Coagulation Cascade in Perioperative Organ Injury, 16*
ANNETTE REBEL

PART II PREOPERATIVE ASSESSMENT

- 4 *The Value of Preoperative Assessment, 26*
ANGELA BADER
- 5 *Perioperative Cardiac Risk Assessment in Noncardiac Surgery, 36*
DIANA AYUBCHA, TARAS GROSH, and LEE A. FLEISHER
- 6 *Cardiovascular Risk Assessment in Cardiac Surgery, 46*
YAS SANAIHA and PEYMAN BENHARASH
- 7 *Central Nervous System Risk Assessment: Preventing Postoperative Brain Injury, 57*
MEGAN MAXWELL, MEGHAN MICHAEL, and DAVID L. MCDONAGH
- 8 *Risk Assessment and Perioperative Renal Dysfunction, 67*
ROBERT A. SICKELER and MIKLOS D. KERTAI
- 9 *Pulmonary Risk Assessment, 83*
RAMESH SWAMIAPPAN and MAURIZIO CEREDA
- 10 *Hematologic Risk Assessment, 101*
AUDREY E. SPELDE, DONAT R. SPAHN, and PRAKASH A. PATEL

PART III PRESERVATION OF ORGAN FUNCTION AND PREVENTION AND MANAGEMENT OF PERIOPERATIVE ORGAN DYSFUNCTION

SECTION 1

Cardiovascular System, 122

- 11 *Prevention of Ischemic Injury in Cardiac Surgery, 123*
CHRISTOPHER R. BURKE and EDWARD D. VERRIER

- 12 *Prevention of Ischemic Injury in Noncardiac Surgery, 143*
ANNEMARIE THOMPSON and STEPHEN HARRISON GREGORY

- 13 *Treatment of Perioperative Ischemia, Infarction, and Ventricular Failure in Cardiac Surgery, 154*
MUATH BISHAWI and CARMELO A. MILANO

- 14 *Perioperative Management of Valvular Heart Disease, 181*
NATHAN H. WALDRON, MARTIN I. SIGURDSSON, and JOSEPH P. MATHEW

- 15 *Prevention and Management of Perioperative Dysrhythmias, 191*
STEPHEN A. ESPER and AMAN MAHAJAN

SECTION 2

Renal System, 207

- 16 *Perioperative Fluid Management, 208*
MICHAEL J. SCOTT

- 17 *Preservation of Renal Function, 222*
JAMIE R. PRIVRATSKY, ANNE CHERRY, BENJAMIN Y. ANDREW, and MARK STAFFORD-SMITH

- 18 *Evaluation and Treatment of Acute Oliguria, 251*
RAMESH VENKATARAMAN and JOHN A. KELLUM

- 19 *Perioperative Management of Renal Failure and Renal Transplant, 259*
HOLDEN K. GROVES and H.T. LEE

SECTION 3

Pulmonary System, 276

- 20 *Prevention and Treatment of Postoperative Pulmonary Complications, 277*
BENEDICT CHARLES CREAGH-BROWN

SECTION 4

Central Nervous System, 289

- 21 *Carotid and Intracranial Surgery, 290*
VIJAY K. RAMAIAH, MICHAEL L. JAMES, and DHANESH K. GUPTA

- 22 *Protecting the Central Nervous System During Cardiac Surgery, 311*
JOHN G. AUGOUSTIDES

- 23 *Preservation of Spinal Cord Function, 335*
KIRSTEN R. STEFFNER and ALBERT T. CHEUNG

24 *Perioperative Management of Acute Central Nervous System Injury*, 355

JOVANY CRUZ NAVARRO and W. ANDREW KOFKE

SECTION 5

Gastrointestinal System, 410

25 *Prevention and Treatment of Gastrointestinal Morbidity*, 411

ANDREW ISKANDER, EHAB AL-BIZRI, ROTEM NAFTALOVICH, and TONG J. GAN

SECTION 6

Hematology and Coagulation, 427

26 *Prevention and Management of Deep Vein Thrombosis and Pulmonary Embolism*, 428

IAN J. WELSBY and KATHLEEN CLAUS

27 *Perioperative Management of Bleeding and Transfusion*, 435

STEVEN ELLIS HILL and DAISUKE FRANCIS NONAKA

SECTION 7

Infections, 443

28 *Prevention of Perioperative Surgical Site Infection*, 444

Q. LINA HU and CLIFFORD Y. KO

SECTION 8

Obstetric, 458

29 *Perioperative Protection of the Pregnant Woman*, 459

RICHARD C. MONTH

30 *Preservation of Fetal Viability During Noncardiac Surgery*, 475

VICTORIA BRADFORD and ROBERT GAISER

PART IV EARLY POSTOPERATIVE CARE

SECTION 9

Specific Operations, 486

31 *Cardiac Surgery*, 487

PINGPING SONG, MICHAEL HOLMES, and G. BURKHARD MACKENSEN

32 *General Thoracic Surgery*, 505

THOMAS K. VARGHESE, JR

33 *Major Abdominal Surgery*, 511

JESSICA Y. LIU and JYOTIRMAY SHARMA

34 *Major Orthopedic Surgery*, 521

LISBI RIVAS, RYAN D. SCULLY, TAMMY JU, JAMES DEBRITZ, and BABAK SARANI

35 *Solid Organ Transplantation*, 530

JANE LEE, SHYAMASUNDAR BALASUBRAMANYA, and VATCHE G. AGOPIAN

36 *Multisystem Trauma*, 543

TIMOTHY J. DONAHUE and LILLIAN S. KAO

37 *Neurosurgery*, 552

AMANDA L. FAULKNER and MICHAEL L. JAMES

SECTION 10

Specific Problems, 563

38 *Sepsis and Septic Shock*, 564

JAMES BURTON and MERVYN SINGER

39 *Acute Respiratory Failure*, 576

CHARLOTTE SUMMERS, ROB S. TODD, GARY A. VERCRUYSE, and FREDERICK A. MOORE

40 *Endocrine and Electrolyte Disorders*, 587

PETER INGLIS, EUGENE W. MORETTI, and DUANE J. FUNK

41 *Improving Pain and Outcomes in the Perioperative Setting*, 607

NEIL RAY and THOMAS BUCHHEIT

42 *Postoperative Cognitive Dysfunction and Delirium*, 613

MARK F. NEWMAN, MILES BERGER, and JOSEPH P. MATHEW

43 *Role of Palliative Care*, 628

TOBY B. STEINBERG and RACHEL A. HADLER

PART V CONFLICTING OUTCOMES VALUE BASED CARE

44 *Economic Analysis of Perioperative Optimization*, 638

THOMAS L. ARCHER, ERIN MADDY, and ALEX MACARIO

45 *Improving Health-Care Quality Through Measurement*, 645

JASON B. LIU, JILL S. SAGE, and CLIFFORD Y. KO

46 *Delivering Value Based Care: The UK Perspective*, 659

ALEXANDER I.R. JACKSON and MICHAEL P.W. GROCOTT

47 *Transitions From Hospital to Home*, 668

RACHEL E. THOMPSON and AMIR K. JAFFER

Index, 672

This page intentionally left blank

PART

I

INTRODUCTION AND BACKGROUND

Implications of Perioperative Morbidity for Long-Term Outcomes

KRISTEN C. ROCK, MARK F. NEWMAN, and LEE A. FLEISHER

The practices of anesthesiology, surgery, and critical care are continuously improving. Through advances in each field, a number of patients with increasingly severe comorbidities are undergoing riskier and more complex operations and experiencing better outcomes. In recent years, intraoperative mortality has decreased by a factor of 10.¹ Nonetheless, perioperative morbidity and mortality remain high. If perioperative mortality were classified as a disease, it would be the third leading cause of death in the United States.² Thirty-day postoperative mortality after noncardiac surgery could be as high as 1% and 2% for inpatients in the United States.^{3,4} Despite an enhanced ability to effectively care for this growing high-risk group, these patients remain at substantial risk for the development of perioperative organ dysfunction—myocardial, pulmonary, neurologic, and renal. The degree of dysfunction ranges from mild (sometimes silent) and even undetected injury to profound organ injury, coma, or death. The implications of the more immediate and severe injury occurring in the perioperative period have long been identified, but only recently has it been noted that injury thought to be transient may have long-term consequences. This realization is at the core of this book. In this chapter, we focus on identifying perioperative morbidity and touch on strategies to prevent or to treat these complications, many of which will be described further in subsequent chapters.

Cardiac Injury

Myocardial injury has long been a dreaded complication during and after surgery. Each year, over 1 million people having noncardiac surgery will experience a cardiovascular complication.⁵ Although the number of patients with documented acute myocardial infarctions within 30 days of surgery is significant, the number of patients who likely experience silent and undetected myocardial injury during and after surgery is sobering. This injury now has a name: “MINS” (myocardial injury after noncardiac surgery). MINS is defined as a peak troponin T of 0.03 ng/mL or greater judged to be due to myocardial ischemia (i.e., no evidence of a nonischemic etiology causing the troponin T elevation); the definition does not require the presence of an ischemic feature such as electrocardiogram changes or anginal symptoms. Due to the common absence of ischemic features, it is estimated that more than 80% of MINS events will be missed without routine monitoring of troponin levels after surgery.

However, the 30-day mortality increase for patients with MINS suggests that this is an important perioperative event with implications for changes in clinical management.⁶ The VISION (Vascular Events in Noncardiac Surgery Patients Cohort Evaluation) trial was a prospective international study of more than 15,000 patients who received routine troponin monitoring for 72 hours postoperatively. It demonstrated that patients with peak troponin T concentrations less than 0.01 ng/mL had a 1.0% mortality, whereas patients with concentrations of 0.02 ng/mL, 0.03–0.29 ng/mL, or 0.30 ng/mL or greater had 30-day mortality rates of 4.0%, 9.3%, or 16.9%, respectively.⁷ A composite of non-fatal cardiac arrest, congestive heart failure, stroke, and death occurred in 18.8% of the MINS cohort and only 2.4% of patients without MINS in the VISION study, an eightfold increase.⁷ A similar study in a colorectal surgery population echoed these results. In this study, mortality of patients with troponin levels greater than 0.01 ng/mL within the first 48 hours after surgery was 20%.⁸

Importantly, the mortality attributed to MINS is not exclusively cardiac in nature. Nevertheless, recognition of MINS by the perioperative physician is an opportunity to improve outcomes. In the colorectal study, 17 of 40 patients with elevated troponin levels went on to receive an ischemic evaluation and were started on medical therapy, which may have prevented worse outcomes.⁸ Research on whether instituting medical therapy in MINS will reduce mortality is ongoing.⁹

While recognizing and responding to myocardial injury postoperatively is an important area to target to improve patient outcomes, preventing myocardial injury in the first place has been an area of intense study over the past two decades. Large prospective clinical trials investigating the ability of pharmaceutical interventions to reduce myocardial injury, morbidity, and mortality were some of the first trials with adequate power and long-term outcome assessment to lead to an understanding of the implications of perioperative injury. The use of perioperative β -blockade to reduce myocardial injury became popular two decades ago. The POISE (Perioperative Ischemic Evaluation) trial in 2008 challenged widespread use of β -blockers, showing a reduction in ischemic events but an increase in bradycardia, hypotension, strokes, and all-cause mortality for high-risk patients not receiving a β -blocker prior to surgery.¹⁰ A 2014 systemic review of randomized controlled trials (RCTs) investigating new institution of perioperative β -blockage supported the POISE trial’s results, suggesting

Visit <https://ebookmass.com> today to explore

a vast collection of ebooks across various genres, available in popular formats like PDF, EPUB, and MOBI, fully compatible with all devices. Enjoy a seamless reading experience and effortlessly download high-quality materials in just a few simple steps. Plus, don't miss out on exciting offers that let you access a wealth of knowledge at the best prices!

Exploring the Variety of Random Documents with Different Content

you're talking about. That's mighty important news."

"Oh, I do, sir! My father told me all about it just before we left Two Harbors."

There was another pause, during which the hammering outside the door became more insistent. Sandy could hear the lock beginning to give.

"That's very strange, Sandy," Mr. Kennedy said doubtfully. "I should think I would have heard of it before now."

"You were supposed to, you were supposed to, sir!" Sandy shouted. "That's what all that hammering's about, sir. It's Captain West trying to break into the radio shack. He doesn't want you to know!" Sandy caught his breath and went on, "I hate to tell you this, sir, but I'm afraid Captain West has been working for Mr. Chadwick and against you."

171

This time, the silence at the other end was so prolonged that Sandy feared he had been disconnected. At last, Mr. Kennedy spoke again, sadly.

"Sandy, a moment ago, you lifted my spirits as they have seldom been lifted. But, just now, you drove them down again with about the worst piece of news I've ever heard. Let me speak to Captain West."

Wham! Crrrash! Snap!

At that moment, with a blow of demonic strength, the enraged Captain West burst the last shred of the barrier separating him from Sandy Steele.

He charged into the room shouting threats and with his eyes shooting sparks of hatred. As he did, Sandy held out the telephone to him, and said, "Mr. Kennedy would like to speak to you."

All of Captain West's bluster and bravado seemed to vanish at the sight of that tall, blond boy who had stood so unflinchingly in his path and now extended the telephone toward him with that calm announcement. The fight went out of his eyes. The color drained from his face. His powerful shoulders sagged and his whole body seemed to slump.

Without a word, Captain West turned and dragged himself from the room.

"He doesn't want to speak to you, sir."

"So it's true, then! Well, get me someone else in authority, Sandy. Put Mr. Briggs on."

Sandy paused, awkwardly.

"I'm sorry, Mr. Kennedy, but I think the mate was working against you, too."

"Oh, Lord, Lord! Am I surrounded by unfaithful employees? Goodness, is there no one on the *James Kennedy* that I can trust except you, boy? Who else is there in authority?"

"There's Mr. Davis, sir—the next officer. But he's lost his glasses and can't see. We've just been through a terrible storm, sir."

"Yes, yes, I read about it in the newspapers. But I thought you would be in port at Detroit. Is there no one

else?"

Sandy pondered. Then his face brightened. "There's Sam and Gunnar."

"Sam! Who on earth is Sam? Oh, no, no—never mind, Sandy. Forget that question. Goodness knows I have good reason to trust your judgment. Put Sam on, whoever he is!"

173

Sandy grinned.

"Get Sam up here, Cookie," he shouted. Then, returning to Mr. Kennedy, he asked, "Anything else, sir?"

"Anything else! My goodness, boy—what else is there? For the second time within a week, I find myself in your debt."

Sandy was too embarrassed to make any comment, and Mr. Kennedy rushed on, "I don't know how to thank you, boy—but I'll think of something. Remember, you're to call me the moment you arrive in Buffalo. Both you and your friend. By the way, how is he?"

"Jerry? Oh, he's all right, sir—just a sprained ankle from the storm."

"My goodness! You have had a stormy voyage, haven't you?"

Sandy grinned again, remembering the plunge into Lake Superior to save Cookie, the fire in the galley as the *James Kennedy* steamed into Lake Huron, that spanking storm on Lake Erie—to say nothing of the combined badgering of Mr. Briggs and Captain West. But Sandy saw no reason to tell Mr. Kennedy exactly how right he

174

was. He just felt good, that was all—so he grinned again and said: “Yes, sir, I guess you could call it a stormy voyage. Here’s Sam.”

Sam stepped up and took the telephone from Sandy’s outstretched hand. His manner was hesitant, for he had never spoken to the owner of the line before. His face was grave, but as he listened, his eyes grew wider and wider. Finally, with an expression of amazement and a snappy, “Yes, sir!” he hung up and turned to Sandy and Cookie.

“Well, what do you know?” he murmured.

“Well, what?”

“I’m in charge!”

Cookie’s mouth popped open. He began to dance in excitement, flipping his apron in the air. “Hooray for Sam!” he shouted. “Yippee! Yip, yip—yippee!”

“All right, Cookie,” Sam cautioned, laughing. “Take it easy, now. It’s only until we get to Buffalo.”

“Who cares?” Cookie yelled. “Let’s celebrate, anyway. I’ll bake a cake!”

Both Sandy and Sam had to laugh again at the capering little man. His eyes shone when he promised to bake a cake, but when Sandy reminded him that he would have to do it with burned flour, a sly look came over his face and he pointed an accusing finger at the blond youth and shouted, “It’s all his fault, Skipper! There’s the culprit! That’s the landlubber who burned down my nice, new galley!”

Sandy grinned happily. "Honestly, Cookie, you should have been an actor. Why, I almost believed those things you said about me, myself." His face turned serious. "How did you know about Mr. Briggs and Captain West, anyway?"

"I heard 'em talking," Cookie said simply. "The night of the fire, you put me in the mate's cabin, remember? Well, it was after they called you in that I overheard them talking about Mr. Kennedy selling out to Chadwick." Cookie struck his fist into his palm savagely. "Chadwick!" he said. "Me sail on another Chadwicker? I'd sooner die on land! No, sir, Sandy, when I heard that, I knew I had to help you. I told myself I'd swim all the way to Buffalo with you on my back, if it meant blocking that deal."

"But you can't swim, Cookie."

"No matter," the little man said grimly. "I'd've done it. I'd do anything, before I'd sail a Chadwicker again."

Of course, that unhappy notion was no longer a possibility—not after the scene which took place in Mr. Kennedy's office several hours after Sandy and Cookie and Sam had gone below to break the news to Jerry James.

176

Mr. Paul Chadwick had arrived and been ushered into Mr. Kennedy's conference room, where the lawyers of both firms had assembled to handle the details of the sale. Mr. Chadwick came striding in. He was a fat, pompous man with pouches beneath his pale eyes. He had a sharp way of speaking and he ordered his employees around as if he thought they belonged to him, body and soul.

"Well, Kennedy," he shot out as he took a seat at the table, "I presume everything is in readiness?"

"Yes, Paul," Mr. Kennedy said softly. "Everything is set."

"Good. All right, Cogswell," he snapped, turning to one of his lawyers. "Let's have the papers. Quick, man! The papers. Don't dawdle like a kindergarten child; give me the papers!"

Red-faced, the lawyer pulled a legal-looking document from his brief case and passed it to Mr. Chadwick. In the embarrassed silence that followed, the only sound that could be heard was the scratching of Mr. Chadwick's pen as he hurriedly signed his name.

177

"Here, John," he said grandly, passing the document across the table. "Now, you sign right there. And, then, the Kennedy boats will belong to me."

"I think not, Paul," Mr. Kennedy said easily as he accepted the papers and tore them swiftly in two. "I think they'll still belong to me."

He handed the torn contract back to his astounded shipping rival. Mr. Chadwick stared at the pieces in disbelief.

"But this is preposterous!" he shouted. "You can't do this to me! You agreed to sell, Kennedy. Why, why," he spluttered, his cheeks puffing out like a frog's, "why, I'll sue!"

"Go ahead, Paul," Mr. Kennedy said, getting to his feet. "And, by the way, you may be getting busy soon, shipping all that new, high-grade ore down from the Mesabi—as I expect to—and you may find yourself in

need of a skipper or a mate.” He smiled. “I know just the men for you, Paul. Fine, dependable men—men like Captain West or Mr. Briggs.”

A shadow of dismay passed over Mr. Chadwick’s pale eyes. Without a word, he jumped to his feet and hurried from the room.

CHAPTER FIFTEEN

Safe in Port

That night, under a star-dusted sky, with the lights of Buffalo to guide her and beckon her on, the battered *James Kennedy* limped into port.

And waiting to greet her, in addition to her owner and his personal physician, was a throng of chattering newspaper reporters and photographers. The tale of the *James Kennedy's* ordeal at sea had preceded her. Even as the vessel was slowly warped into her berth, photographers raced alongside her in excitement-eagerly snapping pictures of her damaged superstructure with its wrecked pilothouse. The flashing of their light bulbs added to the general air of excitement.

The moment the ship was securely in port, the newspapermen came hurrying up the gangplank.

"Where's the skipper?" they shouted. "Where's Captain West?"

179

"There he is!" one of them shouted in dismay. "He's gone ashore already."

True enough. The moment the newshawks had come aboard the *James Kennedy* and spilled over her decks, Captain West had seized the chance to slip down the gangplank. Now he was hastening out of sight. He all but broke into a run when he heard the yell of the newsman who had identified him. But he slowed again when he saw that his path would take him past Mr. John Kennedy, the employer he had attempted to betray. His step faltered. He tried to lift his eyes to the level of Mr. Kennedy's, to brazen it out. But he could not. His gaze fell.

He slunk by and disappeared in the darkness.

With a heavy sigh, Mr. Kennedy turned to the man beside him and said, "Come, Doctor—we'd better have a look at that James boy."

The two men made their way up the gangplank.

"Sandy!" Mr. Kennedy exclaimed, when he caught sight of the tall, blond youth standing at the head of the ramp. "Goodness, boy, I'm certainly glad to see you." His face took on a worried look and his eyes searched Sandy Steele's lanky frame. "You're all right, aren't you, boy? I mean, I certainly wouldn't want John Steele holding me responsible for—"

180

"Oh, I'm fine, sir," Sandy said, smiling. "Just a bit hungry, that's all."

"We'll fix that soon enough," Mr. Kennedy vowed. "But let's have a look at your friend first. Where is he?"

"Down below, sir. Here, I'll lead the way."

Sandy and Mr. Kennedy and the physician, whose name was Dr. Hilliard, disappeared down the hatch. As they did, a tall, thin, furtive figure crept around the cabin. It glanced around fearfully, before sneaking down the gangplank and running up the wharf.

It was Mr. Briggs.

Below, meanwhile, Dr. Hilliard had gently unwrapped the torn sheets bound around Jerry James's ankle. He studied the injured member with professional concern. Both Jerry and Sandy watched his face anxiously, for both of them were thinking of the football season that lay ahead.

"John," Dr. Hilliard said, with mock gravity, "if they had more people like this young oak stump around, I'd be out of business."

"Hooray!" Sandy cried, and Jerry James grinned with delight.

"Of course," the doctor hurried on, "you'll need a cane for a week or two, young man. But otherwise I'd say you're none the worse for wear."

181

At that remark, Jerry winked at his friend. He rubbed his stomach sorrowfully. "Outside of being hungry, Doctor, I'd say—"

Mr. Kennedy broke in.

"Boys," he said, glancing at his watch, "I promise you that in fifteen minutes you will be in my dining room sitting down to the best meal that was ever served up in Buffalo."

And they were.

Less than a week later, the two friends were back on the Great Lakes again—bound for Minnesota once more, this time to ship aboard a load of grain.

They had had a wonderful time as the guests of Mr. Kennedy. They saw all the sights of Buffalo, including Niagara Falls, that great escarpment over which Lake Erie plunges, and they had crossed the Peace Bridge into Canada to have one of those famous beefsteaks at the Chinaman's in Fort Erie. Then, after Dr. Hilliard had pronounced Jerry James fit to walk again without the use of his cane, they had taken ship again.

Their vessel was now the *Cecil Rogers* (almost all Great Lakes boats are named for shipping leaders), for the beloved old *James Kennedy* was in drydock undergoing extensive repairs.

182

And their new skipper was?

"Sam!" the two youths cried as they came aboard.

Sure enough, it was their old friend, and there was Cookie, too, grinning at them from over the rail. And there was Gunnar towering behind him!

"Boys," Sam said, chuckling, "meet my mate."

There were shouts of jubilation and hand-shaking all around as Sandy and Jerry got their gear aboard ship and into their quarters. This time, they had a room twice as large as the rathole they had shared on the *James Kennedy*. And this time, aboard the *Cecil Rogers*, they shipped as deck hands.

"No more galley slavery for us," Jerry exclaimed, and Sandy nodded in agreement.

That was how the two lads from Valley View passed the remainder of that summer. They sailed up and down the Lakes, as the *Cecil Rogers* hauled its cargoes of ore, grain and coal. Sometimes they made Canadian ports, and once they passed through the Welland Ship Canal into Lake Ontario, the lake that lies the farthest east.

At last came the sad day when they had to reclaim Old Faithful from the hands of Sandy's dad and say goodbye to their friends. School would reopen in another week, and they had to be heading west.

183

"Gootpy, poys," Gunnar called from the rail, as Jerry's jalopy began to chug away from the loading dock where the *Cecil Rogers* lay. "Haf goot trip."

"Send us a picture of your football team," Cookie yelled, and Sam shouted, "Keep your chin up, boys. Maybe we'll see you next summer."

"Goodbye, goodbye," Sandy Steele and Jerry James cried, and then they were out of sight.

184

CHAPTER SIXTEEN

Summer's End

There was a hint of autumn in the air as Jerry James swung Old Faithful off the highway and up the ramp leading to Valley View. Both boys felt a deep surge of pleasure run through them as they picked out the familiar landmarks that told them they had come home again.

The dusty old jalopy rolled along Ridge Road and past the March mansion.

"Doesn't look like anybody's home," Sandy said.

"That's what I thought," said Jerry. "I wonder what happened to our friend Pepper."

Sandy shrugged. "I don't know. But it sure was good spending all those weeks without him. Jerry!" he yelled. "Did you hear that?"

Jerry James had, and his eyes sparkled with delight.

185

What the two boys had heard was the unmistakable thud of a foot meeting pigskin!

"Boy!" Sandy said. "I can hardly wait for school to open. Sounds funny, I know, but if the fall means school, it means football, too!"

"You bet, Sandy. The only thing I missed on the Great Lakes was not having a chance to practice."

"Oh, we'll be all right. At least, we stayed in shape."

They had. They were as hard as the decks of the *James Kennedy* and their bodies were burned the color of walnut.

"Well, here we are," Sandy said, as Old Faithful swung into his street. Jerry nodded. In another instant, he had mechanically lifted his foot from the gas pedal, as he always did when he approached Sandy's house, and the jalopy had begun to slow down. Grasping his jam-packed suitcase in one hand, Sandy Steele vaulted lightly to the pavement. "See you tonight at the drugstore, Jerry," he called, and then he turned and ran into the house.

"Mom!" Sandy Steele called as the screen door slammed shut behind him. "Mom! It's me. Sandy. I'm home!"

186

The whole crowd from Valley View High had gathered at the James drugstore that night, and, of course, most of the talk was about how the school's football team would fare in the league competition that season, and especially how its heroes stacked up against those from the arch rivals in Poplar City.

As usual, Quiz Taylor was the center of a crowd as he spied off the weight, height and past season's record

of nearly all the boys who would be playing for Poplar City in the coming fall.

"Honestly, fellows," he said, his round face gloomy, "I don't see how we can beat them. Of course, we have Jerry and Sandy, but we don't have a runner to compare with their fullback, Tomkins."

"What about Pepper March?" someone asked. "He scored six touchdowns for Valley View last year."

"Yes, Quiz," Sandy said. "What about Pepper? Where is he, anyway? You'd think he'd be here, the night before school opens."

Quiz Taylor began to shake with laughter.

"D-didn't you hear about Pepper?" he sputtered, his face crinkling with merriment. "Haven't you heard about what happened to Stanley Peperdine March?"

187

"No. What happened?"

"Yeah, Quiz," someone else said. "Cut the comedy, and let us in on the joke, too."

Still chuckling, Quiz Taylor said, "Pepper won't be home for another two weeks. A couple of the sailors aboard that ship they were on came down with one of those rare, tropical diseases. Pepper and his father had to spend the summer in quarantine."

There was a roar of laughter at the expense of the unpopular Pepper.

Sandy Steele turned to his friend and said, "Well, Jerry, we may have had a stormy voyage, but I'll bet we had a

better summer than Pepper did.”

Transcriber's Notes

- Copyright notice provided as in the original—this e-text is public domain in the country of publication.
- Silently corrected obvious typographical errors; left non-standard spellings and dialect unchanged.

*** END OF THE PROJECT GUTENBERG EBOOK STORMY VOYAGE

Updated editions will replace the previous one—the old editions will be renamed.

Creating the works from print editions not protected by U.S. copyright law means that no one owns a United States copyright in these works, so the Foundation (and you!) can copy and distribute it in the United States without permission and without paying copyright royalties. Special rules, set forth in the General Terms of Use part of this license, apply to copying and distributing Project Gutenberg™ electronic works to protect the PROJECT GUTENBERG™ concept and trademark. Project Gutenberg is a registered trademark, and may not be used if you charge for an eBook, except by following the terms of the trademark license, including paying royalties for use of the Project Gutenberg trademark. If you do not charge anything for copies of this eBook, complying with the trademark license is very easy. You may use this eBook for nearly any purpose such as creation of derivative works, reports, performances and research. Project Gutenberg eBooks may be modified and printed and given away—you may do practically ANYTHING in the United States with eBooks not protected by U.S. copyright law. Redistribution is subject to the trademark license, especially commercial redistribution.

START: FULL LICENSE

*THE FULL PROJECT GUTENBERG
LICENSE*

PLEASE READ THIS BEFORE YOU DISTRIBUTE OR USE THIS WORK

To protect the Project Gutenberg™ mission of promoting the free distribution of electronic works, by using or distributing this work (or any other work associated in any way with the phrase “Project Gutenberg”), you agree to comply with all the terms of the Full Project Gutenberg™ License available with this file or online at www.gutenberg.org/license.

Section 1. General Terms of Use and Redistributing Project Gutenberg™ electronic works

1.A. By reading or using any part of this Project Gutenberg™ electronic work, you indicate that you have read, understand, agree to and accept all the terms of this license and intellectual property (trademark/copyright) agreement. If you do not agree to abide by all the terms of this agreement, you must cease using and return or destroy all copies of Project Gutenberg™ electronic works in your possession. If you paid a fee for obtaining a copy of or access to a Project Gutenberg™ electronic work and you do not agree to be bound by the terms of this agreement, you may obtain a refund from the person or entity to whom you paid the fee as set forth in paragraph 1.E.8.

1.B. “Project Gutenberg” is a registered trademark. It may only be used on or associated in any way with an electronic work by people who agree to be bound by the terms of this agreement. There are a few things that you can do with most Project Gutenberg™ electronic works even without complying with the full terms of this agreement. See paragraph 1.C below. There are a lot of things you can do with Project Gutenberg™ electronic works if you follow the terms of this agreement and help preserve free future access to Project Gutenberg™ electronic works. See paragraph 1.E below.

1.C. The Project Gutenberg Literary Archive Foundation (“the Foundation” or PGLAF), owns a compilation copyright in the collection of Project Gutenberg™ electronic works. Nearly all the individual works in the collection are in the public domain in the United States. If an individual work is unprotected by copyright law in the United States and you are located in the United States, we do not claim a right to prevent you from copying, distributing, performing, displaying or creating derivative works based on the work as long as all references to Project Gutenberg are removed. Of course, we hope that you will support the Project Gutenberg™ mission of promoting free access to electronic works by freely sharing Project Gutenberg™ works in compliance with the terms of this agreement for keeping the Project Gutenberg™ name associated with the work. You can easily comply with the terms of this agreement by keeping this work in the same format with its attached full Project Gutenberg™ License when you share it without charge with others.

1.D. The copyright laws of the place where you are located also govern what you can do with this work. Copyright laws in most countries are in a constant state of change. If you are outside the United States, check the laws of your country in addition to the terms of this agreement before downloading, copying, displaying, performing, distributing or creating derivative works based on this work or any other Project Gutenberg™ work. The Foundation makes no representations concerning the copyright status of any work in any country other than the United States.

1.E. Unless you have removed all references to Project Gutenberg:

1.E.1. The following sentence, with active links to, or other immediate access to, the full Project Gutenberg™ License must appear prominently whenever any copy of a Project Gutenberg™ work (any work on which the phrase “Project Gutenberg” appears, or with which the phrase “Project Gutenberg” is associated) is accessed, displayed, performed, viewed, copied or distributed:

This eBook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you will have to check the laws of the country where you are located before using this eBook.

1.E.2. If an individual Project Gutenberg™ electronic work is derived from texts not protected by U.S. copyright law (does not contain a notice indicating that it is posted with permission of the copyright holder), the work can be copied and distributed to anyone in the United States without paying any fees or charges. If you are redistributing or providing access to a work with the phrase “Project Gutenberg” associated with or appearing on the work, you must comply either with the requirements of paragraphs 1.E.1 through 1.E.7 or obtain permission for the use of the work and the Project Gutenberg™ trademark as set forth in paragraphs 1.E.8 or 1.E.9.

1.E.3. If an individual Project Gutenberg™ electronic work is posted with the permission of the copyright holder, your use and distribution must comply with both paragraphs 1.E.1 through 1.E.7 and any additional terms imposed by the copyright holder. Additional terms will be linked to the Project Gutenberg™ License for all works posted with the permission of the copyright holder found at the beginning of this work.

1.E.4. Do not unlink or detach or remove the full Project Gutenberg™ License terms from this work, or any files containing a part of this work or any other work associated with Project Gutenberg™.

1.E.5. Do not copy, display, perform, distribute or redistribute this electronic work, or any part of this electronic work, without prominently displaying the sentence set forth in paragraph 1.E.1 with active links or immediate access to the full terms of the Project Gutenberg™ License.

1.E.6. You may convert to and distribute this work in any binary, compressed, marked up, nonproprietary or proprietary form, including any word processing or hypertext form. However, if you provide access to or distribute copies of a Project Gutenberg™ work in a format other than “Plain Vanilla ASCII” or other format used in the official version posted on the official Project Gutenberg™ website (www.gutenberg.org), you must, at no additional cost, fee or expense to the user, provide a copy, a means of exporting a copy, or a means of obtaining a copy upon request, of the work in its original “Plain Vanilla ASCII” or other form. Any alternate format must include the full Project Gutenberg™ License as specified in paragraph 1.E.1.

1.E.7. Do not charge a fee for access to, viewing, displaying, performing, copying or distributing any Project Gutenberg™ works unless you comply with paragraph 1.E.8 or 1.E.9.

1.E.8. You may charge a reasonable fee for copies of or providing access to or distributing Project Gutenberg™ electronic works provided that:

- You pay a royalty fee of 20% of the gross profits you derive from the use of Project Gutenberg™ works calculated using the method you already use to calculate your applicable taxes. The fee is owed to the owner of the Project Gutenberg™ trademark, but he has agreed to donate royalties under this paragraph to the Project Gutenberg Literary Archive Foundation. Royalty payments must be paid within 60 days following each date on which you prepare (or are legally required to

prepare) your periodic tax returns. Royalty payments should be clearly marked as such and sent to the Project Gutenberg Literary Archive Foundation at the address specified in Section 4, "Information about donations to the Project Gutenberg Literary Archive Foundation."

- You provide a full refund of any money paid by a user who notifies you in writing (or by e-mail) within 30 days of receipt that s/he does not agree to the terms of the full Project Gutenberg™ License. You must require such a user to return or destroy all copies of the works possessed in a physical medium and discontinue all use of and all access to other copies of Project Gutenberg™ works.
- You provide, in accordance with paragraph 1.F.3, a full refund of any money paid for a work or a replacement copy, if a defect in the electronic work is discovered and reported to you within 90 days of receipt of the work.
- You comply with all other terms of this agreement for free distribution of Project Gutenberg™ works.

1.E.9. If you wish to charge a fee or distribute a Project Gutenberg™ electronic work or group of works on different terms than are set forth in this agreement, you must obtain permission in writing from the Project Gutenberg Literary Archive Foundation, the manager of the Project Gutenberg™ trademark. Contact the Foundation as set forth in Section 3 below.

1.F.

1.F.1. Project Gutenberg volunteers and employees expend considerable effort to identify, do copyright research on, transcribe and proofread works not protected by U.S. copyright law in creating the Project Gutenberg™ collection. Despite these efforts, Project

Gutenberg™ electronic works, and the medium on which they may be stored, may contain “Defects,” such as, but not limited to, incomplete, inaccurate or corrupt data, transcription errors, a copyright or other intellectual property infringement, a defective or damaged disk or other medium, a computer virus, or computer codes that damage or cannot be read by your equipment.

1.F.2. LIMITED WARRANTY, DISCLAIMER OF DAMAGES - Except for the “Right of Replacement or Refund” described in paragraph 1.F.3, the Project Gutenberg Literary Archive Foundation, the owner of the Project Gutenberg™ trademark, and any other party distributing a Project Gutenberg™ electronic work under this agreement, disclaim all liability to you for damages, costs and expenses, including legal fees. YOU AGREE THAT YOU HAVE NO REMEDIES FOR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY OR BREACH OF CONTRACT EXCEPT THOSE PROVIDED IN PARAGRAPH 1.F.3. YOU AGREE THAT THE FOUNDATION, THE TRADEMARK OWNER, AND ANY DISTRIBUTOR UNDER THIS AGREEMENT WILL NOT BE LIABLE TO YOU FOR ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES EVEN IF YOU GIVE NOTICE OF THE POSSIBILITY OF SUCH DAMAGE.

1.F.3. LIMITED RIGHT OF REPLACEMENT OR REFUND - If you discover a defect in this electronic work within 90 days of receiving it, you can receive a refund of the money (if any) you paid for it by sending a written explanation to the person you received the work from. If you received the work on a physical medium, you must return the medium with your written explanation. The person or entity that provided you with the defective work may elect to provide a replacement copy in lieu of a refund. If you received the work electronically, the person or entity providing it to you may choose to give you a second opportunity to receive the work electronically in lieu of a refund. If the second copy is also defective, you may demand a refund in writing without further opportunities to fix the problem.

Welcome to our website – the perfect destination for book lovers and knowledge seekers. We believe that every book holds a new world, offering opportunities for learning, discovery, and personal growth. That's why we are dedicated to bringing you a diverse collection of books, ranging from classic literature and specialized publications to self-development guides and children's books.

More than just a book-buying platform, we strive to be a bridge connecting you with timeless cultural and intellectual values. With an elegant, user-friendly interface and a smart search system, you can quickly find the books that best suit your interests. Additionally, our special promotions and home delivery services help you save time and fully enjoy the joy of reading.

Join us on a journey of knowledge exploration, passion nurturing, and personal growth every day!

ebookmasss.com